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09/816,927	03/23/2001	Franz Auerbach	GR 98 P 2651 P	6167

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LERNER AND GREENBERG, P.A.  
Post Office Box 2480  
Hollywood, FL 33022-2480

EXAMINER

ROSE, KIESHA L

ART UNIT

PAPER NUMBER

2822

DATE MAILED: 01/30/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

09/816,927

Applicant(s)

AUERBACH ET AL.

Examiner

Kiesha L. Rose

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 23 March 2001.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-11 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-11 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 23 March 2001 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

## **DETAILED ACTION**

This Office Action is in response to the filing of the application.

### ***Drawings***

The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference sign(s) not mentioned in the description:

Fig. 6, #14.

A proposed drawing correction, corrected drawings, or amendment to the specification to add the reference sign(s) in the description, are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

### ***Claim Rejections - 35 USC § 112***

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1,2 and 11 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claims 1 and 11 are indefinite because they refer to the semiconductor region surrounding the semiconductor zone like a "well". It is unclear how the semiconductor region will surround the semiconductor zone like a well. Claims 1 and 2 disclose that the semiconductor region be interrupted "in each case" at at least

one location by channels. It is unclear what "case" is being referred to in this instance. These limitations do not clearly distinguish the invention.

Claims 5 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claim 5 is indefinite because it is referring to a semiconductor body having an edge region. It is unclear what the edge region is composed of or its usage in the invention. These limitations do not clearly distinguish the invention.

Claim 6 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claim 6 is indefinite because it is referring to an edge zone in the semiconductor body. It is unclear what the edge zone is composed of or its usage in the invention. These limitations do not clearly distinguish the invention.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-3, 5-7 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nishizawa et al. (U.S. Patent 5,175,598) in view of Stengl (U.S. Patent 5,113,237).

Nishizawa discloses a semiconductor-switching device (Fig. 2) that contains a semiconductor body (4,5) of first conductivity type N having a first and second surface which are opposite to each other, a first electrode (2') formed on the first surface, a second electrode (5') formed on the second surface, a semiconductor zone (2) of second conductivity type P, where a PN junction is formed between, and is in contact with the first electrode (2'), an injector disposed in a surface of the semiconductor body (4,5), semiconductor regions (3) of second conductivity type P with a second doping concentration provided in the semiconductor body (4,5) that are disposed at a respective distance from the semiconductor zone (2) so that the semiconductor regions (3) surround the semiconductor zone (2), semiconductor regions (3) that are interrupted by channels formed in the edge region in the semiconductor body (4,5) at a plurality of locations for increasing voltage where the channels are configured such that electric field spikes are avoided when a reverse voltage is applied between the first and second electrodes and an insulating zone (6) formed on the semiconductor body (4,5) that shields charge carriers. Nishizawa discloses all of the limitations except for the semiconductor body having a doping concentration greater than  $5 \times 10^{13}$  charge carrier  $\text{cm}^{-3}$ . Whereas Stengl discloses a semiconductor device (Fig. 1) that contains a semiconductor body (1) with a doping concentration of  $10^{18} \text{ cm}^{-3}$ . Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the switching device of Nishizawa by incorporating the semiconductor body to have a doping concentration of  $10^{18} \text{ cm}^{-3}$  to properly form a conductive region in a semiconductor layer as taught by Stengl.

Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nishizawa et al. and Stengl as applied to claim 1 above, and further in view of Siergiej et al. (U.S. Patent 5,945,701).

Nishizawa and Stengl disclose all of the limitations except for the semiconductor body having a drift region. Whereas Siergiej discloses a static induction transistor (Fig. 12) that contains a semiconductor body, which contains a drift region (38) and channel regions (36) formed in drift region. The drift region is formed so that the charge carriers can flow from one region to the other. (Column 3, lines 27-31) Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the semiconductor devices of Nishizawa and Stengl by incorporating a drift region in the semiconductor body, which will allow for the charge carriers to flow from one region to the other as taught by Siergiej.

Claims 8 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nishizawa et al. and Stengl as applied to claim 1 above, and further in view of Notley (U.S. Patent 5,324,971).

Nishizawa and Stengl disclose all of the limitations except for the semiconductor body to contain field plates and guard rings. Whereas Notley discloses a semiconductor device (Fig. 4) that contains a semiconductor body (2) that has field plates (20) formed on a surface of the semiconductor body. The field plates are formed on a major surface of the semiconductor body to cause electric fields to spread laterally outward across the active area to increase the breakdown voltage of the semiconductor device. (Abstract) The semiconductor body also contains a guard ring (12) that

surrounds the edge of the semiconductor body. The guard ring is formed to influence the voltage at the field plate areas. (Column 5, lines 15-24) Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the semiconductor devices of Nishizawa and Stengl by incorporating field plates and guard rings to increase the breakdown voltage of the semiconductor device as taught by Notley.

Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nishizawa et al. in view of Stengl.

Nishizawa discloses a semiconductor switching device (Fig. 2) that contains a transistor comprising a semiconductor body (4,5) of first conductivity type N having a first and second surface which are opposite to each other, a first electrode (2') formed on the first surface, a second electrode (5') formed on second surface, a semiconductor zone (2) of second conductivity type P where a PN junction is formed between and is in contact with the first electrode (2'), semiconductor regions (3) of second conductivity type P with a second doping concentration provided in the semiconductor body (4,5) that are disposed at a respective distance from the semiconductor zone (2) so that the semiconductor regions (3) surround the semiconductor zone (2), semiconductor regions (3) that are interrupted by channels formed in the edge region in the semiconductor body (4,5) at a plurality of locations for increasing voltage where the channels are configured such that electric field spikes are avoided when a reverse voltage is applied between the first and second electrodes and an insulating zone (6) formed on semiconductor body (4,5) that shields charge carriers. Nishizawa discloses all of the

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limitations except for the semiconductor body to have a doping concentration greater than  $5 \times 10^{13}$  charge carrier  $\text{cm}^{-3}$ . Whereas Stengl discloses a semiconductor device (Fig. 1) that contains a semiconductor body (1) with a doping concentration of  $10^{18} \text{ cm}^{-3}$ . Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the switching device of Nishizawa by incorporating the semiconductor body to have a doping concentration of  $10^{18} \text{ cm}^{-3}$  to properly form a conductive region in a semiconductor layer as taught by Stengl.

### **Conclusion**

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kiesha L. Rose whose telephone number is 703-605-4212. The examiner can normally be reached on M-F 8:30-6:00 off 1st Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carl Whitehead, Jr. can be reached on 703-308-4940. The fax phone numbers for the organization where this application or proceeding is assigned are 703-308-7722 for regular communications and 703-308-7722 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

  
CARL WHITEHEAD, JR.  
SUPERVISORY PATENT EXAMINER  
TECHNOLOGY CENTER 2800



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RR

KLR

January 23, 2002